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FUSARIUM WILT OF TOMATO

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Fusarium wilt of tomato, incited by the soil-borne fungus Fusarium oxysporum Schlecht. f.sp. lycopersici (Sacc.) Snyd. & Hans., occurs throughout the world wherever tomatoes are grown. In the United States, the area east of the Mississippi River and south of the Ohio River incurs the greater losses. In Florida, the disease has been most prevalent in the Manatee-Ruskin and Delray Beach areas (4). Fusarium wilt rarely has occurred in Dade County because of the alkaline soils or in the Naples-Immokalee area because of the grower practice of moving to virgin land (2). Although the disease is common and destructive in the Manatee-Ruskin area on the spring crop maturing in May, disease occurrence in this area is greatly reduced during the fall crop season.

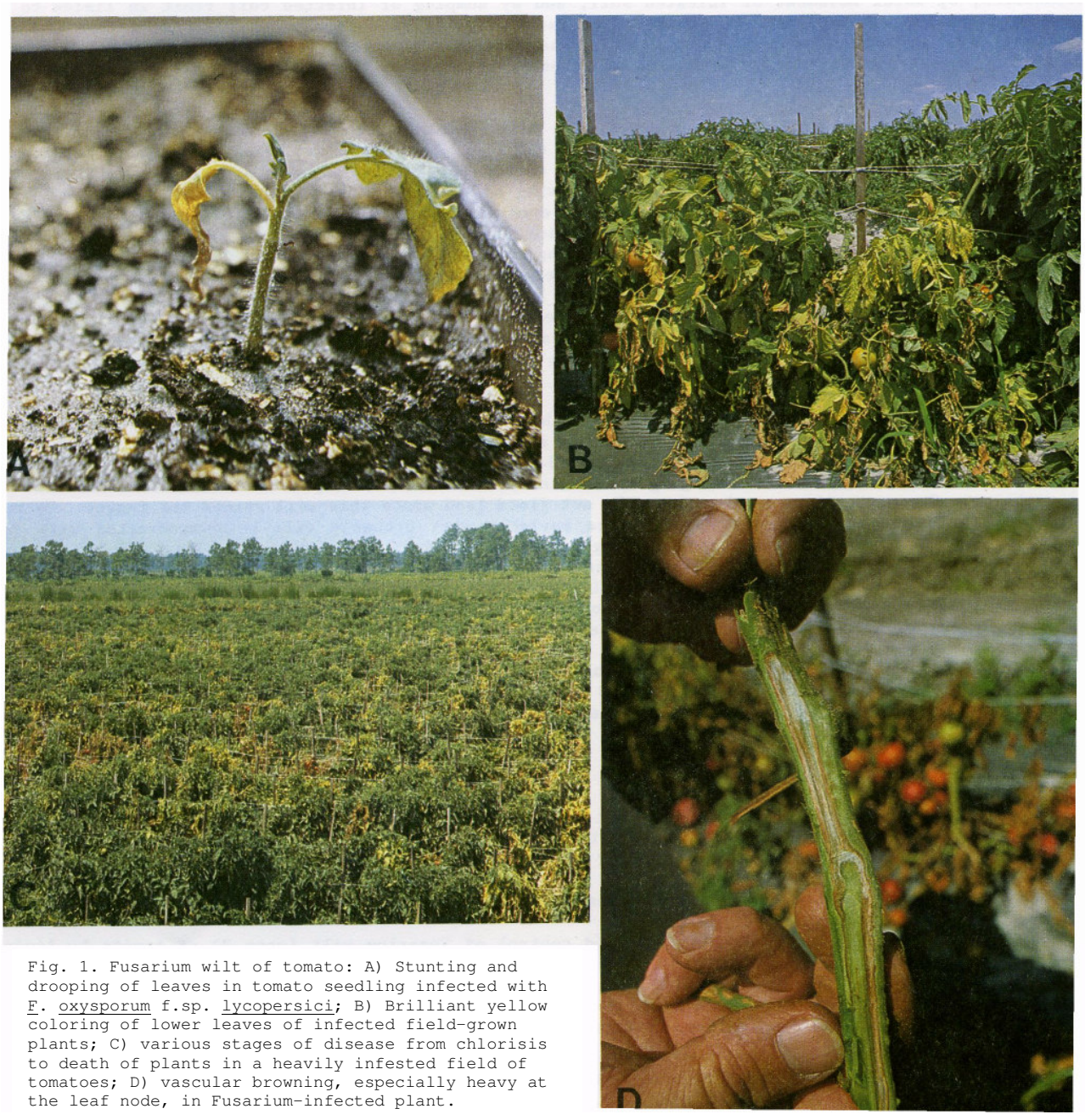

Fig. 1. Fusarium wilt of tomato: A) Stunting and drooping of leaves in tomato seedling infected with F. oxysporum f.sp. lycopersici; B) Brilliant yellow coloring of lower leaves of infected field-grown plants; C) various stages of disease from chlorisis to death of plants in a heavily infested field of tomatoes; D) vascular browning, especially heavy at the leaf node, in Fusarium-infected plant.

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Races 1 and 2 of the tomato wilt fungus commonly occur in Florida (4,5); however, current fresh market varieties are resistant to these races. A new physiological race recently was found in the Manatee-Ruskin tomato-growing area, causing 50-80% plant loss in some fields. A helicopter survey conducted by the Division of Plant Industry showed that 25 of 91 fields in this area had Fusarium wilt. No commercial varieties are known to be resistant to the new race. Potential sources of resistance need to be located and incorporated into varieties suitable for Florida.

F. oxysporum f.sp. lycopersici lives in the soil from season to season and can survive for years in soil not planted to tomatoes or even in fallow soil (6). The fungus is favored by acid, sandy soils and is inhibited by alkaline soils. Virulence of the pathogen is enhanced by micronutrients and ammoniacal nitrogen, and decreased by nitrate nitrogen. The optimum temperature for disease development is 80 to 90 F (27 to 32 C).

Dissemination of F. oxysporum f.sp. lycopersici occurs by the transplanting of infected seedlings, by the reuse of contaminated tomato stakes, by infested soil on stakes, workers, tools, machinery, trucks, automobiles, by water movement of infested soil, and by dumping of infected cull fruit in fields to be cropped to tomatoes (4,6). Seed transmission of races 1 and 2 is possible but relatively rare and unimportant (6). Consequently, the appearance of Fusarium wilt in a new area usually is traceable to the movement of infested soil into the area, use of infected transplants, or the in situ development of a new pathogenic race.

SYMPTOMS. Infected seedlings are stunted, the older leaves droop and curve downward, the veinlets are cleared, and the plants frequently wilt and die (6) (Fig. 1A). Vascular browning is quite prominent. Symptoms on older plants generally become apparent during the interval from blossoming to fruit maturation. The earliest symptom is the brilliant yellowing of the older, lower leaves. These yellow leaves often develop on one side of the plant; similarly, even the leaflets on one side of the petiole may turn yellow before those on the other side. The yellowing gradually becomes more extensive until the entire plant is affected (Fig. 1B). Yellowing is accompanied by wilting of the plant which initially occurs during the hottest part of the day. The wilting becomes progressively more severe until the plant collapses and dies (Fig. 1C). The vascular tissue of a diseased plant often is dark brown in color, with the discoloration extending far up the stem, and becoming especially noticeable in the petiole scar (6) (Fig. 1D). The browning of the vascular system is strong evidence of the disease in both mature and seedling plants. Fruit infection may occur and can be detected by the brown discoloration of the vascular tissue within the fruit.

CONTROL. Use resistant tomato varieties for the control of the common races 1 and 2. Sanitation, manipulation of cultural and fertility practices, and fumigation must be used to control the new race since no resistant commercial varieties are available (1,4). Prevent movement of Fusarium-infected plants and Fusarium-infested soil clinging to machinery, vehicles, tools, and stakes into areas free of the pathogen. Steam-sterilize used stakes. Do not flood land since this will spread the fungus. Do not irrigate with ditch water or pond water, since surface water probably will be contaminated with the pathogen. Keep tomato fields away from seedling production houses. Raise the soil pH to 6.5-7.5 and use nitrate nitrogen rather than ammoniacal nitrogen. Fumigation with Vorlex, a 3:2 mixture of chloropicrin and D-D (3), methyl bromide (67%) plus chloropicrin (33%), or any of several other broad-sprectrum soil fumigants should greatly inhibit disease development. A 5- to 7-year crop rotation will not eliminate the Fusarium fungus, but will greatly reduce losses.

SURVEY AND DETECTION. Look at plants during time of blossoming to fruit maturation. Bright yellowing of the foliage progressing to wilting and plant death, accompanied by brown discoloration of the vascular system is strong evidence of this disease.

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